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Analysis

Greening Development Lending in the Americas: Trends and Determinants

Fei Yuan[a,*], Kevin P. Gallagher[b]

[a] Harvard University, United States of America
[b] Boston University, United States of America

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ABSTRACT

Latin America and the Caribbean (LAC) faces a $110 billion-dollar annual gap in financing for climate change. This paper shows that development banks operating in the Americas are falling far short of playing the key role they need to assume in filling these gaps. According to our estimates, development banks provide just $7 billion per year in terms of green finance in general, and climate finance in particular is just $4.4 billion per year. A corresponding econometric analysis shows green financial flows tend to go to countries with higher human development scores and left of center governments, and derive from development banks where the majority of the shareholder governments have strong environmental performance in their home country.

1. Introduction

Over the past 15 years, the annual GDP growth rate of Latin America and the Caribbean (LAC) countries has been roughly 3%, lagging far behind that of other developing regions (World Bank, 2018; Cadena et al., 2017). Meanwhile, the region faces a $110 billion annual gap in finance for climate change mitigation and adaptation (IADB, 2012). The geographical location of LAC endows the region with abundant wealth in natural resources, but also a particular vulnerability to climate change. Although LAC is only responsible for approximately 12.5% of global greenhouse gas (GHG) emissions, it is disproportionately impacted by climate change as many areas in the region are seriously affected by droughts, flooding, cyclones and the El Nino-Southern Oscillation (ENSO) phenomenon (Mapplecroft, 2014). Damages resulting from extreme weather related to climate change have not only jeopardized socioeconomic activities but also eroded wealth accumulated from previous episodes of economic growth. According to a joint study by the IADB with the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) and the World Wildlife Fund (WWF), the annual economic costs of climate change in LAC will reach $100 billion by 2050 (IADB, 2012).

Development finance institutions (DFIs) have a unique role to play in closing financing gaps for development in LAC. DFIs, at their best, seek to correct key market and government failures and crowd in private sector economic activity into areas such as cleaner energy technologies, as well as into policy formation and anti-poverty programs. What is more, as LAC seeks to move past this latest economic downturn, development banks can act in a counter-cyclical manner in order to spark economic recovery and trigger structural transformation throughout the region's economies.

At the same time, DFIs have also been asked to play an enhanced role in meeting the Sustainable Development Goals (SDGs) including Goal 7, that pledges to "ensure access to affordable, reliable, sustainable and modern energy for all (United Nations, 2015)." To this end a number of development banks have pledged to increase finance for sustainable development in general, and low carbon development in particular. In 2015, after China pledged to infuse $3.2 billion into a developing country fund for climate change, the Asian Development Bank, the World Bank and others began pledging major increases as well. The World Bank pledged to increase climate finance to $29 billion (an increase by one third) by 2025 and the Inter-American Development Bank pledged to make climate finance 25–30% of total lending by that time.

This study provides an assessment of the extent to which the existing development banking regime in LAC is poised to help the region achieve these goals. More specifically, we ask two research questions. First, to what extent do DFIs in LAC support green development in the region? Second, what are the key drivers of green lending to LAC countries?

For the first question, we create a database of development lending between 2007 and 2016 across the Americas and estimate the extent to which such finance is 'green' based on a new tracking methodology agreed upon by major multilateral, sub-regional, and national development banks. These banks define green finance as financing for climate change mitigation or adaptation, as well as environmental protection and remediation at the project level. We also supplement our

* Corresponding author.
E-mail address: fyuan@g.harvard.edu (F. Yuan).

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analysis and by attempting to understand the determinants of green finance commitments.

This paper's contribution to the literature is two-fold. First, we map green finance from major public development banks in LAC between 2007 and 2016. Several multilateral development banks including the World Bank, the Inter-American Development Bank have been tracking climate finance since 2011 and publish their joint report annually (for example, see MDBs, 2016). Similarly, International Development Finance Club (IDFC) and Climate Policy Initiative have tracked green finance commitments of IDFC members,[1] a group of national and sub-regional development banks across the world and have published their data annually since 2014. Our tracking complements these efforts encompassing a broader range of development banks that have operations in LAC. In addition, we take stock of green finance commitments of these banks between 2007 and 2016 to provide a more comprehensive view over the past decade.

Second, fast growing literature has analyzed the drivers of general lending from development agencies to developing countries, mostly focused on multilateral development banks, represented by the World Bank and regional development banks (Hopkins et al., 1998; Round and Odedokun, 2004; Babb, 2009; Neumayer, 2003a, 2003b; Harrigan et al., 2006; Kilby, 2006 among others). Much attention has been concentrated on the preferences of the supply side, such as conditionality, the relationship between the board member countries and the recipient countries. Nevertheless, Humphrey and Michaelowa (2013) found that demand side factors also played an important role in multilateral lending by reviewing lending preferences of three major development banks in LAC including a sub-regional bank.

However, very few studies have examined the environmental profile of development finding and its determinants. Nielson and Tierney (2006) provided evidence of positive association between lending and "the environmental preferences of predicted coalitions of member states on executive boards", using data from the 1980s when MDBs were pressured to reform their environmental loans. Our econometric analysis is similar to theirs but taking advantage of a new wave of data with the aim to evaluate the pledged effort for sustainable development since mid 2000s. We believe our paper further contributes to understanding the determinants of green finance commitments from development banks.

Our findings demonstrate that total DFI in Latin America and the Caribbean has stood at approximately 1.1% of GDP per annum since 2003. Thirty-two percent of all development bank finance in LAC is not green. This significant amount of development bank finance flows into extractive industries, the generation of fossil fuels, and conventional infrastructure projects that can accentuate global climate change, trigger local environmental problems, and adversely impact local communities.

Green finance is 17% of total development bank financing in LAC. Since 2007, green finance has been $70 billion equal to $7 billion per year. $4.4 billion of the green finance is for climate mitigation and adaptation. Using probit and panel data analyses, we identify donor's environmental performance as the most important factor that drives green finance in LAC. This is consistent with the fact that public development banks are still the most important players in promoting sustainable development and leveraging finance in this field.

The paper proceeds as follows: Section 2 describes the methodological approach, including analytical scope, green finance criteria, analytical strategy and data collection. Section 3 presents the results of estimates of green finance, section 4 presents our econometric analyses and Section 5 offers a discussion and conclusion.

2. Methods

2.1. Analytical Scope

Eleven DFIs provide the majority of development finance to Latin American and Caribbean governments over the past 15 years. Our sample thus includes traditional multilateral development banks (MDBs) operating in the region such as the World Bank and the Inter-American Development Bank (IADB), sub-regional development banks like CAF-Development Bank of Latin America and the Caribbean Development Bank (CaDB), as well as a number of national development banks that have been making loans to other LACn governments, such as Brazil's National Development Bank (BNDES), the China Development Bank (CDB) and Germany's KfW.

We create a database of *international* commitments[2] to LAC governments and state-owned enterprises (SOEs) for each of these banks for the period 2003–2016. For national development banks operating in the region, we only track and analyze their activities outside of their country of origin. The full list of banks examined for this study are:

- The World Bank Group (WB)
- Inter-American Development Bank (IADB)
- CAF-Development Bank of Latin America
- The Caribbean Development Bank (CaDB)
- European Investment Bank (EIB)
- Agence Française de Développement (AFD)
- The Brazilian Development Bank (BNDES)
- KfW Development Bank (KfW)
- China Development Bank (CDB)
- China Export Import Bank (CHEXIM)
- Export-Import Bank of the United States (US EXIM)

We examine the extent to which international development banks operating in LAC support green finance. For the 14-year period under examination we track the annual flows of each bank to LAC to demonstrate the evolution of development finance in the region in terms of the total volume and composition as well as each bank's contribution. Furthermore, we create a more detailed project-level database for the period of 2007–2016 in order to pinpoint the composition of development bank lending for this latter period (project-level data is not widely available for all the banks previous to 2007).

Our research is limited to development finance with sovereign lending, usually commitments to sovereign governments and their affiliations (such as national development agencies, SOEs, etc.), rather than to both sovereign governments and the private sector. Indeed, many of the banks in our study provide lending to both public and private sectors, and many of them even have a private sector financing arm, such as the International Finance Corporation (IFC) of the World Bank Group, the Proparco of the French Development Agency (AFD) and the German Investment and Development Corporation (DEG) of the KfW group. Taking the year of 2014 as an example, the non-sovereign guaranteed operations of IADB were only $2.8 billion compared to the total commitments of $13.8 billion, which accounted for 20%. A similar percentage was seen in the lending of KfW and AFD. The private sector share of World Bank and EIB's financing was higher, at 30–40%. CAF was an exception, whose non-sovereign guaranteed operations were larger than sovereign operations, reaching 60% of total commitments (Fig. 1).

We limit the scope of study to lending with sovereign risks based on two considerations. First, the majority of loans provided by development banks are still sovereign guaranteed loans and for some banks in our sample there is either no private sector lending or the data for such lending is difficult to obtain. Second, green finance is often a field less attractive to private investors because the returns of many green projects are less likely to be commensurate with risks in the short term.

[1] A full list of IDFC members can be found here.

[2] For tracking purposes, we estimate the amount of commitments instead of real disbursements and we acknowledge there might be discrepancies between these two. All the numbers reported in this paper are based on commitments approved in each year.

Therefore, we restrict this analysis to public lending in order to illuminate this process and examine the possibility of leveraging more private investment to support green and sustainable development throughout the operations of development banks.

2.2. Data Collection

We compile official data from banks' project databases and annual reports. The project information of the IADB and the IBRD of the World Bank group is downloaded directly from respective project datasets, and the data of CAF, CaDB, EIB, AFD and US EXIM Bank was extracted from their annual reports. We refer to the newly launched transparent portals of KfW and BNDES for their project info and the China-Latin America Finance database at the Inter-American Dialogue for data from China's policy banks in LAC (see Gallagher and Meyers, 2014). A full list of these databases can be found in Annex I.

2.3. Green Finance Criteria

There are a variety of definitions and approaches to measuring 'green finance.' We deploy the definition of green finance and methodology of green mapping of the International Development Finance Club (IDFC)—an association of national and sub-regional development banks across the world— as our benchmark. In our sample, CAF, BNDES, CDB, AFD, and KfW are all members of the IDFC. The IDFC compared its methodology for tracking climate finance with that of the MDBs and found them 'largely consistent' for climate change mitigation but less so for climate adaptation (IDFC, 2015a). To close the gap, IDFC collaborated with the major MDBs in 2014 to create a common set of principles for tracking development bank finance for climate mitigation and adaptation (IDFC, 2015b). We deploy the newly agreed-upon methodology to track green development finance across this sample of development banks operating in LAC. The IDFC defines 'green finance' as financing for climate change mitigation or adaptation, as well as environmental protection and remediation at the project level. Table 1 shows how we deploy the IDFC mapping method to our study.

Building a project-level database from 2007 to 2016, we code projects as being 'green finance' or not. Then, for green projects we divide them into the subcategories listed here in Table 1. There are significant limitations to the IDFC approach, as it is not clear whether these 'categories' of green financial flows are significantly correlated with actual reductions in emissions and other social and environmental impacts.

One categorization worth mentioning is that, according to the IDFC definition, hydropower plants can be labeled green, "only if net emission reductions can be demonstrated." Hydropower constitute a large part of LAC's effort to greening its power supply. However, it is not clear whether all these projects can be classified as green. To follow the IDFC principal, we adopt an additional estimation strategy developed by Ray (2016):

"*In order to operationalize the IDFC's principle that dams must demonstrate emissions reductions in order to qualify as sustainable, we rely on the rules of the Clean Development Mechanism (CDM) of the Kyoto Protocol. The CDM allows projects – in this case, dams – to seek certification of net emissions reduction, so it is an apt framework for this paper (CDM, no date). The CDM classifies hydroelectric plants according to their power density: the ratio of watts of capacity to square meters of reservoir surface area. By focusing on power density, the CDM acknowledges that anaerobic biomass degradation at the bottom of a reservoir produces methane, which has a more potent contribution to climate change than the carbon dioxide created by aerobic biodegradation on land. So dams with smaller reservoirs per kilowatt of capacity (or – more aptly – higher levels of capacity per square meter of reservoir area) are associated with less methane for every kilowatt of power. Above a certain power density threshold, the reservoir's impact is considered to be negligible enough to be adequately offset by the use of renewable energy implicit in hydropower.*

The CDM uses two thresholds: power density levels of four and ten. ***This report uses the more lenient threshold of at least four watts per square meter. Run-of-the-river dams, which have no reservoirs, effectively have an infinite power density and are automatically considered to be sustainable.***"

Drawing from this approach, we group green finance into three categories: 1) Clean energy and mitigation of greenhouse gas emissions 2) Adaptation to climate change impacts and 3) Water, sanitation, and other environmental objectives.

2.4. Statistical Analyses of Determinants of Green Development Finance

To identify the factors that determine the allocation of green development finance by development banks among countries in the region between 2007 and 2016, we consider both determinants of development commitments in general and determinants of environment-focused commitments. There is an extensive literature on how multilateral and bilateral development agencies allocate their lending and aid (Neumayer, 2003a, 2003b). However, lending by development banks to address climate change has not been well studied although the literature on environmental impacts of these banks is quite large (Dixon et al., 2009; Adams, 2009; Rich, 2014 among others).

We deploy two models to understand how green development finance is allocated in LAC. First, we use a linear probability model (1). Our dependent variable y_i is a binary outcome: Greenfinance. Greenfinace = 1 if a country receives green commitment from a bank, conditional on receiving general commitment; otherwise, Greenfinance = 0. We test the probability of a country receiving green finance in this model.

$$P(y_i = 1 \mid X_i) = X_i'\beta \tag{1}$$

In model (2), we use a panel approach to identify what factors determine the "greenness" of development finance that each LAC country receives from a development bank. The dependent variable of model II is the percentage of green finance as the total commitment received by a country from a development bank. For example, the total amount committed by the World Bank to Argentina in 2015 was 1293 million, of which 265 million was labeled as "green" based on our criteria. Therefore, the share of green finance is 0.21. The empirical model is the following:

$$y_{it} = a_i + \sum_{K=1}^{K} \beta^k * X_{it}^k + \varepsilon_{it} \tag{2}$$

where y_{it} denotes the greenness (in percent), a_i is the constant and ε_{it} is the estimation error, country and year fixed effects are included in the regressions.

X_i in the two models are a set of covariates consisting of both traditional drivers of multilateral and bilateral investment and those specific to green finance following this existing literature. Specifically, we include.

- **GDP per capita** (log), **Inflation(log)** to reflect the income level and economic governance of the recipient country following (Alesina and Dollar, 2000; Neumayer, 2003; Humphrey and Michaelowa, 2013);
- **Population size (log)** as studies have shown that less populous countries tend to receive more development funding (Isenman, 1976; Dowling and Hiemenz, 1985; Alesina and Dollar, 2000; Neumayer, 2003a, 2003b);
- **Human Development Index (HDI)** to indicate the human development needs of recipient countries (Neumayer, 2003b);
- **Politics and Political proximity**. Previous studies have shown that donor's political interests have played an important role in multilateral and bilateral lending (Anderson et al., 2006; Kilby, 2006), therefore we include two variables that measure the political orientation toward economic policy of recipients (left = −1, center = 0 and right = 1), and also the similarity of donor and

Table 1
Summary of IDFC green finance tracking methodology.

Category	Definition	Representative Eligible Project Categories
Clean energy and mitigation of greenhouse gas (GHG) emissions	Activity that contributes to **reducing or avoiding GHG emissions** or to enhance GHG sequestration	Renewable energy supply Energy efficiency in industry and buildings Process emissions in industry and fugitive emissions Sustainable transport Agriculture, forestry and land-use Carbon capture and storage Budget support to a climate change mitigation policy
Adaptation to climate change impacts	Activity that intends to **reduce the vulnerability** of human or natural systems to the impacts of climate change and climate-related risks, by maintaining **or increasing adaptive capacity and resilience**	Water preservation Agriculture, natural resources, ecosystem adaptation Coastal protection Other disaster risk reduction Budget support to a climate change adaptation policy
Water, sanitation, and other environmental objectives	Activity that does not directly target climate change mitigation or adaptation but is **related to sustainable development with a positive impact on the environment**	Water supply Wastewater treatment Waste management Industrial pollution control Soil remediation and mine rehabilitation Sustainable infrastructure Biodiversity

Source: IDFC (2014a) green finance tracking methodology.

recipient's orientation (if donor and recipient have same orientation = 1, otherwise = 0).

- **Environmental Performance Index (EPI) of donors and recipients** as a proxy for environmental preferences of both demand and supply sides. EPI (2016) is constructed through the calculation of > 20 indicators reflecting national-level environmental data, from water resources, air quality and health impact to biodiversity, climate and energy.

2.5. Data

- GDP per capita, population and inflation data were downloaded from the World Development Indicator database (World Bank, 2018).
- Human Development Index was downloaded from UNDP Human Development Report database.
- The politics variable was extracted directly from the Database of Political Institutions 2015. Political orientation refers to incumbent party orientation with respect to economic policy using the following criteria: *Right: for parties that are defined as conservative, Christian democratic, or right-wing. Left: for parties that are defined as communist, socialist, social democratic, or left-wing. Center: for parties that are defined as centrist or when party position can best be described as centrist* (e.g. *party advocates strengthening private enterprise in a social-liberal context*). We do not follow Humphrey and Michaelowa (2013) and Dreher et al. (2009) that used the UN voting with the US as a proxy for political closeness to the US, because in our sample, there are multiple bilateral banks such as AFD, KfW and two Chinese banks, and other regional multilateral banks for which the US is not necessarily a donor.
- Environmental Performance Index (EPI) data were extracted from Environmental Performance Index website (Center for Environmental Law and Policy, 2016). The index has been published once every two years since 2006. The data for missing years were calculated as simple average of two adjacent years. Multilateral donors' EPI are calculated based on the largest donor's EPI, for example, the US is the largest donor for both the World Bank and the Inter-American Development Bank, and we use the EPI of the US for these two banks. The largest donors of CAF are Venezuela, Peru and Colombia and for European Investment Bank, are Germany, France, UK and Italy. Jamaica and Trinidad and Tobago are the biggest donors of the Caribbean Development Bank. Their EPIs are simple averages of these largest donors' EPIs.

3. Development Banks and Green Finance, LAC 2003–2016

We estimate that development banks operating in LAC provided approximately $630 billion to the LAC region between 2003 and 2016. The yearly average was $45 billion, representing upwards of 1.1% of annual GDP in LAC with a peak of 1.7% of GDP in 2010. As shown in Fig. 1, finance to sovereign governments is the lion's share of development finance in LAC, at $478 billion during the same period or 0.8% of GDP.

Four development banks provided the lion's share of sovereign development finance in LAC: the IADB, World Bank, CDB, CAF and CHEXIM contributed roughly 88% of the total loans during the period examined. The most significant newcomers to the LACn development finance landscape are China's policy banks, the CDB and CHEXIM, which combined have become the largest annual lenders in LAC since 2007. Without development finance from China development bank finance in LAC would have been 30% less due to the cutting back of commitments from the World Bank and other sources (Fig. 2).

Despite the upward trend of development bank finance in LAC, since 2011 the World Bank has tightened its lending to the region to pre-crisis levels. The US EXIM bank and three European financial institutions maintained their shares and accounted for 9% of the total, though the US EXIM bank has halted new lending in 2015. Moreover, it is worth mentioning that BNDES, the development bank of Brazil, began to increase its overseas investments in 2007 and has financed projects in several countries in Latin America including Cuba, the Dominican Republic, Venezuela, Argentina, and Ecuador. Although the total amount of commitments is still small compared to other banks, BNDES is a new development finance player in Latin America that is gathering momentum. In three consecutive years from 2010 to 2013, BNDES

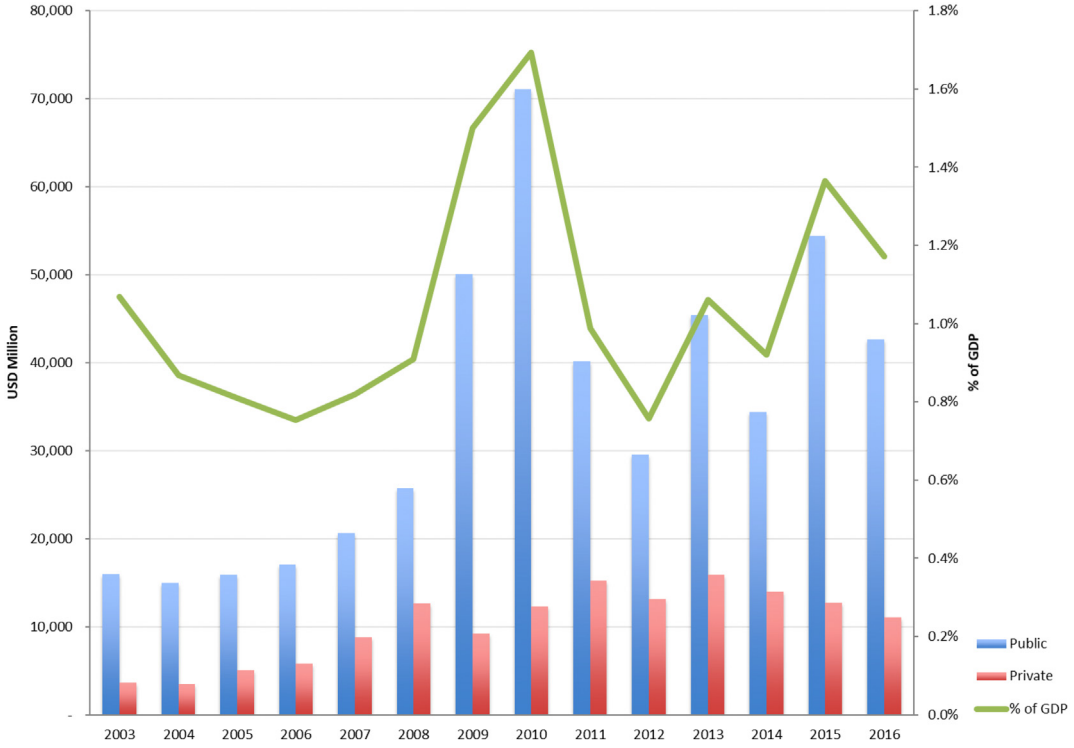

Fig. 1. Development finance in LAC 2003–2016.
Data source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database; GDP source: World Development Indicator Database, Latin America and the Caribbean (excluding high income countries).
Note: No data for BNDES in 2016 and USEXIM only opened for business for two months in FY 2016 due to lapse in authority.

annually average overseas commitments surpassed $1 billion (Fig. 3).

Different development banks appear to serve different clients in the Americas. Brazil is the most popular debtor, receiving loans from all the banks in our sample except the Caribbean development bank. US EXIM Bank devotes most of its resources to Mexico and Colombia while China's banks prefer Venezuela, Brazil, Ecuador, Bolivia and Argentina (Gallagher and Irwin, 2015).

3.1. Estimating Green Finance in LAC: 2007–2016

To what extent has the annual 1% of GDP in development bank finance to sovereign governments in the region contributed to sustainable development? In an attempt to answer this question, we create a project-level database of the banks in our sample from 2007 to 2016 and examined the extent to which different banks supported green

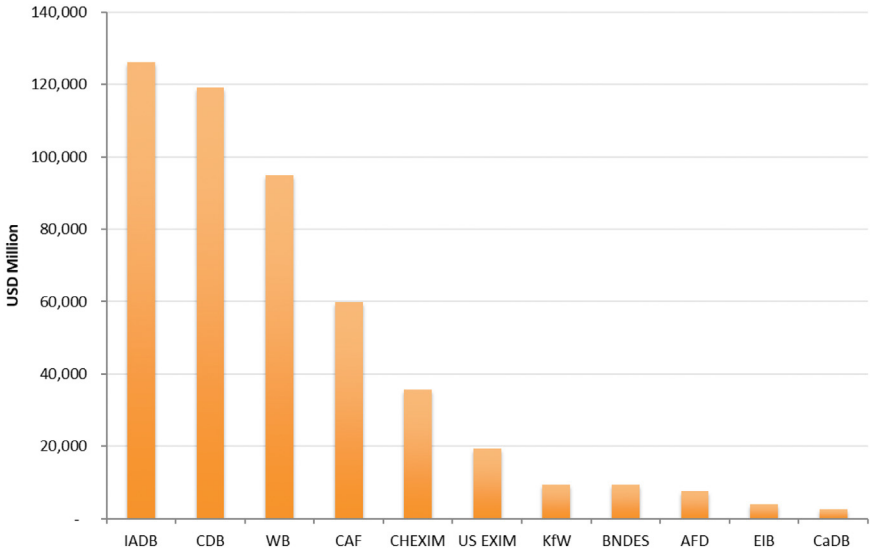

Fig. 2. Development bank commitments in LAC 2003–2016.
Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database
Note: No data for BNDES in 2016 and USEXIM only opened for business for two months in FY 2016 due to lapse in authority.

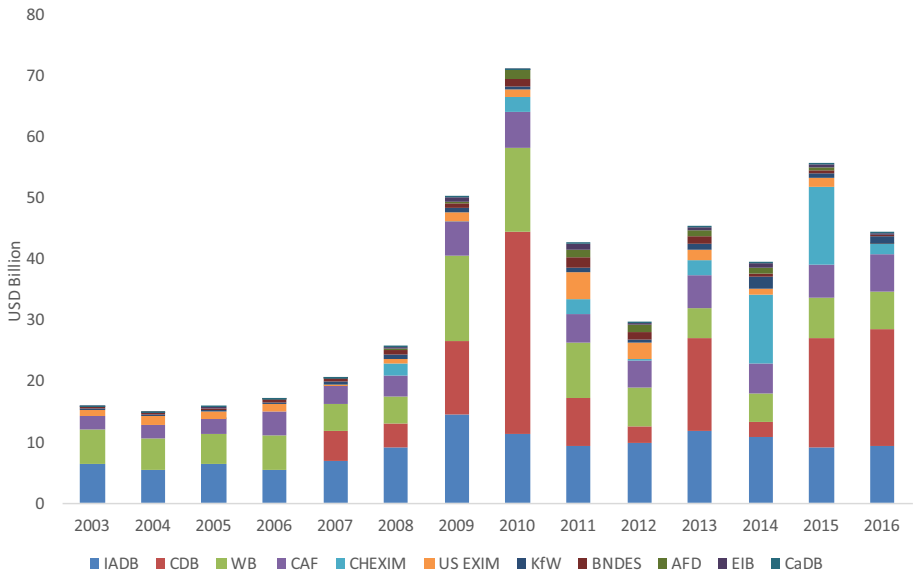

Fig. 3. Development bank commitments to governments in LAC 2003–2016.
Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database. Note: No data for BNDES in 2016 and USEXIM only opened for business for two months in FY 2016 due to lapse in authority.

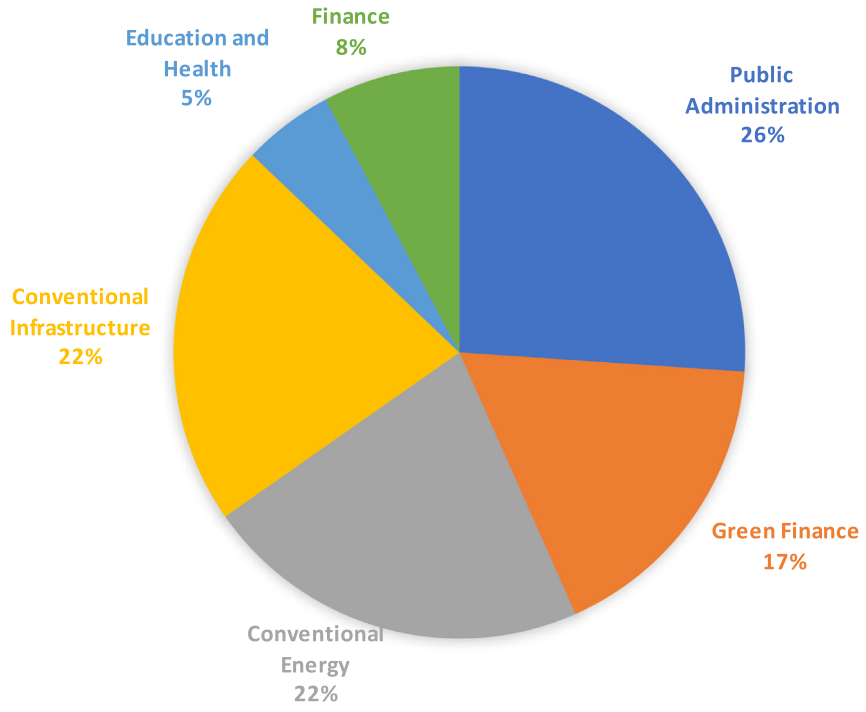

Fig. 4. Development finance sector distribution 2007–16.
Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database.

finance (as defined by the IDFC). Between 2007 and 2016, LAC governments received more than $414 billion from these eleven development banks in the following six sectors exhibited in Fig. 4: governance and social development, green finance, conventional infrastructure, conventional energy, finance, education and health. According to our estimates, one-third of development bank commitments were focused in the first category: efforts to improve the public administration and social development of the region.

The second largest proportion of the development bank finance portfolio in the region are conventional infrastructure (22%) and conventional energy (22%). Green finance lending comprises 17% of the total amount. Loans and credit lines to support financial services amounted for 8% while another 5% of the total loans went into education and health.

We estimate that development banks provided approximately $70 billion, or $7 billion per year in green finance between 2007 and 2016. Specifically, the majority of green financial flows in LAC are in climate mitigation representing 51% of all green finance, climate adaptation (12%), and water and sanitation (37%). In all then, climate finance amounts to just over $44 billion or $4.4billion per year (Fig. 5).

Table 2 ranks development banks in LAC by the total volume of green financing during the period. By volume, the IADB, the WORLD

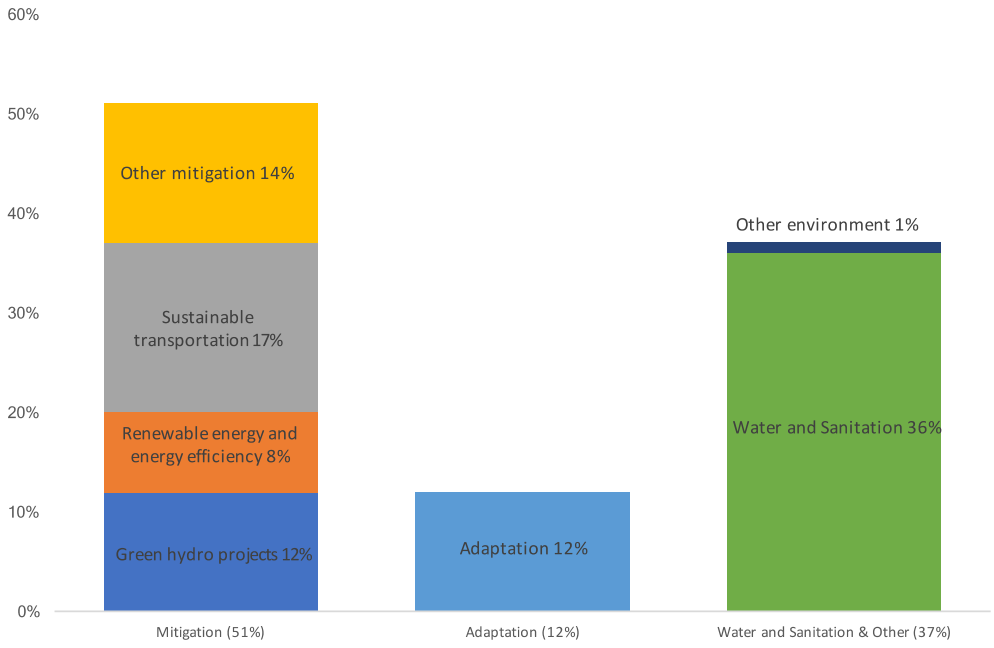

Fig. 5. Composition of green finance in LAC, 2007–16.
Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database.

Table 2
Green finance within banks, 2007–16.

Bank	Green finance amount (USD million)	Percentage of total commitments
IDB	23,218	23%
WB	14,838	20%
CAF	14,253	29%
KfW	4859	74%
CHEXIM	3816	14%
AFD	3434	47%
BNDES	2674	31%
EIB	2123	57%
CDB	718	1%
CaDB	434	21%
US EXIM	–	–

Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database.

BANK, and the CAF stand out as the three largest financiers of green finance in the region. The USEXIM bank provides no green finance to LAC. Considering the percentage of total commitments, the EIB and KfW ranked the highest as the "greenest banks" among their peers.

3.2. Climate Mitigation

Fifty-one percent—or $36 billion—of all development bank green finance in LAC falls into the category of climate mitigation as defined by IDFC. The largest class of mitigation projects by development banks in LAC are clean energy projects including both green hydro and renewable energy projects, which amounted to $14 billion during the period under examination. It should be noted that green energy projects are outweighed by conventional energy (fossil fuels and power transmission) projects by six and half times. While no LAC-wide study has been conducted, a 2008 study of green finance by the MDBs from 1980 to 1999 put global conventional energy finance at three times green finance, down from fourteen times in the early 1980s (Hicks et al., 2008).

3.3. Green Hydro Projects

Based on the categorization strategy in Section 2, we estimate that about 73% of hydroelectric projects financed by development banks in LAC can demonstrate net greenhouse emission reductions, which stands around $8.3 billion. The high percentage of green hydro plants in LAC can be attributed to the advantageous geographical landscape of the region that allows the construction of many over-the-river dams. Table 3 provides examples of green hydro projects.

However, concerns around non-green hydro-electric projects should not be taken lightly, especially in the Latin American case where tropical hydro-electric projects have long been associated with increases in methane emissions and emissions from associated deforestation. Comprehensive reviews of estimates find that tropical hydroelectric

Table 3
Selected hydro projects.

Year	Bank	Country	Project	Amount (USD million)
2016	CHEXIM	Bolivia	Rosita Hydroelectric Power Plant	1000
2014	CHEXIM	Ecuador	Coca-Codo-Sinclair Hydroelectric Dam	1683
2013	CAF	Bolivia	San Jose Hydroelectric Project	95
2012	IADB	Costa Rica	Reventazon Hydropower Project (Costa Rica, 2012)	450[a]
2011	CAF & IADB	Venezuela	Project to Rehabilitate Units 1–6 of the Simon Bolivar Hydroelectric Plant (Guri)	380 + 700
2009	IADB	Bolivia	Misicuni Renewable Energy Hydroelectric Project	101
2007	CAF & IADB	Venezuela	Manuel Piar Hydoelectric Plant Project	600 + 800

Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database.
[a] USD 250 million public lending and USD 200 million private sector lending.

Table 4
Selected renewable energy projects.

Year	Bank	Country	Project	Amount (USD million)
2016	KfW	Mexico	Support for Mexico's Energy Transition to Renewable Energies	240
2016	KfW	CAF	Sustainable Development for Geothermal Projects	290
2016	KfW	Chile	Abengoa's Concentrated Solar Power Plant	127
2016	KfW	Chile	Housing Energy Efficiency Program	147
2016	IADB	Brazil	Financing Program for Sustainable Energy	750
2016	IADB	Chile	Energy Sustainable Program	100
2016	IADB	Nicaragua	Geothermal Exploration Program	76
2015	WB	Argentina	Argentina Renewable Energy for Rural Areas Project	200
2015	IADB	Costa Rica	First Renewable Energy, Transmission and Distribution of Electricity Program	200
2014	IADB	Chile	Arica Solar PV Project[a]	111
2014	KFW	Brazil	Support for Wind Power Projects	335
2013	EIB	Costa Rica	Extension of a Geothermal Power Generating Plant	69
2013	IADB & KFW	Mexico	Program for Renewable Energies, Energy Efficiency and Environmental Protection (EcoCasa)	IADB: 100 & KfW:105
2011	AFD	Mexico	Support for the Federal Electricity Commission's Clean Energy Investment Program	129

Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database.
[a] Private sector lending.

plants tend to emit 7 to 15 times more emissions than non-tropical hydropower, and 2 to 3 times more emissions than gas, oil, or coal plants (Baros et al., 2011; Steinhurst et al., 2012).

3.4. Renewable Energy

Renewable energy finance is significant in the region, and is also one of the areas where innovative co-financing and 'green bond' programs are taking place. Table 4 provides some illustrative examples of major cleaner energy projects financed by development banks in LAC. There are also significant projects in solar, wind, and access to renewable energy to the poor.

Overall, the World Bank and KfW invest the most in wind, solar, energy efficiency across the Americas. While quite small, the IADB has innovative programs to provide off-grid renewable energy access to remote and indigenous communities in the Ecuadoran Amazon (Inter-American Development Bank, 2015a). The KfW has initiated some notable co-financing relationships with developing country-led banks as well. In 2014, KfW provided a loan of $335 million to BNDES to finance wind parks in Brazil. This cooperation between the BNDES and KfW aims to mitigate climate change by supporting renewable energy projects. Similar operations were also carried out in previous years, such as KfW's donation of €21 million to the Amazon Fund (BNDES, 2014). A similar collaboration has occurred between CAF and KfW: in 2016, CAF and KfW signed an agreement for financing geothermal projects ($290 million) (Richter, 2016); during 2011–2013 KfW granted $500 million in credit lines to CAF to support sustainable development by financing projects in renewable energy, energy efficiency, transportation, and water and sanitation (CAF, 2013).

Another innovative co-finance partnership has been formed between the IADB and the People's Bank of China (PBOC), China's central bank. Called the *China Co-financing Fund for Latin America and the Caribbean*, it was founded in 2013 to "to support public and private sector projects that promote sustainable economic growth in the region" (IADB, 2013). In 2015 the fund provided $216 million in support for the construction of the Colonia Arias and Valentines wind farms, each with a capacity to generate 70 MW (IADB, 2015b).

3.5. Sustainable Transport

Financing for sustainable transport is also notable in LAC, representing $12 billion. According to the IDFC, sustainable transport refers to loans that support urban mass transportation and related activity (IDFC, 2014a). This area has gained popularity in LAC recently along with the increasing efforts to increase urban mobility through constructing Bus/Rapid Transit (BRT) and metro systems. Main lenders were the IADB, CAF and World Bank as they have been playing a proactive role in promoting sustainable urban development in this area for some time (Table 5).

Although many countries in LAC have made some progress in

Table 5
Selected sustainable transport projects.

Year	Bank	Country	Project	Amount (USD million)
2016	CAF	Brazil	Urban Infrastructure Program of Sao Bernardo do Campo	125
2016	WB	Ecuador	Ibarra Transport Infrastructure Improvement Project	53
2016	EIB	Ecuador	Quito Metro	45
2016	KfW	CAF	Urban Transportation	110
2015	WB	Peru	Peru Lima Metro Line 2	300
2015	CAF	Brazil	Integration, Mobility and Development Program	100
2015	KfW	Brazil	Modern Transportation Systems for Brazilian Cities	265
2015	BNDES	Venezuela	Caracas Metro Line 5 and Line 2	534
2014	CHEXIM	Argentina	Buenos Aires Metro Line A	162
2014	IADB	Peru	Lima Metro Line 2 and Line 4	300
2013	IADB	Ecuador	Quito Metropolitan Urban Transportation System	100
2012	AFD	Brazil	Mass Transit Policy in Rio de Janeiro State	384
2011	CAF	Panama	Panama Metro Project	400
2011	CAF	Peru	Lima Mass Transportation System	300
2011	World Bank	Colombia	Support to the National Urban Transit Program Project	350
2010	World Bank & IADB	Brazil	Sao Paulo Metro Line 5 Project	WB: 650 & IADB: 481
2009	BNDES	Venezuela	Caracas Metro Line 2	528
2009	CAF	Peru	The first stage of Transit Plan for the city of Lima	300

Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database.

improving and modernizing their infrastructure, the region still faces an enormous infrastructure gap. Development banks' investments in sustainable transport may play an important leveraging role in attracting private investment besides filling the gap. The region has a long history of incorporating public-private partnership (PPP) in large-scale infrastructure projects, such as the flagship Transmilenio project in Bogota, Colombia. The IFC claims that for every dollar invested in climate related projects such as these can mobilize an additional 3–4 dollars from other private sources (IFC, 2013).

3.6. Climate Adaptation

Development finance for climate adaptation is lacking in LAC. According to the IDFC methodology, climate adaptation activities aim to reduce the vulnerability and/or to increase country resilience to climate change impacts. LAC, and especially the Caribbean, is fairly vulnerable to climate change due to its large coastal territories and complex ecosystems. However, external funding for climate change adaptation has been relatively scarce: only one-seventh of the amount spent on mitigation projects in the past 10 years (Mapplecroft, 2014). Our analysis is consistent with this finding. In our project database, the amount of finance for mitigation projects is five times that of adaptation projects. CaDB had the largest percentage of total green finance in climate adaptation, with most projects to help member countries to manage natural disasters. This is not surprising given that many Caribbean countries are under high climate change risks.

In fact, the majority of the development finance adaptation finance was aimed at disaster prevention and management, ranging from institution strengthening to increasing social and infrastructure resilience. Besides CaDB, the World Bank, IADB and CAF provided the majority of funding to this area. Finance for other adaptation activities, such as agriculture, ecosystems, fishery adaptation, was less common (Table 6).

3.7. Water and Sanitation

Water and sanitation projects top the list of green finance allocations by development banks in LAC. More than a third of green finance flowed into areas such as water supply, waste management, water preservation, sanitation etc. These projects generally have two approaches. The first is to extend water and sanitation infrastructure, which contributes to increasing access to basic services of the population in the region. The second is to manage and upgrade the core water supplies themselves.

According to the World Bank, LAC possesses nearly 31% of the world's freshwater, making the region the richest on earth in terms of freshwater availability per person. Latin America's water wealth is not evenly distributed however—with wide inequalities in water supply and sanitation services between urban and rural areas. Furthermore, the increasing urban population has also put water supply and waste treatment services under pressure. Development banks have been seeking to fill this gap, and a number of illustrative examples in this area are exhibited in Table 7. For instance, the coverage of sanitation services in the provinces of the Norte Grande region of Argentina was only 40%, much lower than the national level; and the water supply also faced problems such as unavailability of freshwater, discontinuity and low quality. To mitigate these problems, the IADB invested $500 million in the Norte Grande in order to increase the coverage and improve water and sanitary services in unserved and underserved areas, at the same time, to enhance the efficiency in sector entities and service providers (IADB, Project AR-L1136).

In terms of the second approach of managing water resources, development banks initiated projects that directly target the abundant water sources in LAC. These projects often help to restore the quality of water through increasing the control and treatment of the waste discharged into water resources, for example, the environmental sanitation program of the IADB for municipalities in the Guanabara Bay Area in Brazil (Table 7). Furthermore, environmental sanitation is sometimes combined with social inclusion programs, as CAF allocated $275 million in Ecuador in 2013 to attend to the basic needs of the poorest populations of the country.

BNDES is another example. In 2010, BNDES subscribed to USD 330 million corporate bonds in a private issue to support Companhia de Saneamento de Minas Gerais'a (COPASA) plans to enlarge water treatment and sanitation plants in Brazil. The specific issuance also hopes to foster the reduction of energy and chemicals use and waste and support reforestation and conservation efforts (International Development Finance Club, 2014b).

Table 6
Selected water and sanitation projects.

Year	Bank	Country	Project	Amount (USD million)
2016	CAF	Argentina	Integrated Program of Habitat	75
2016	CAF	Argentina	Construction Project of Water Treatment Plant in the Parties of La Plata, Berisso and Ensenada	119
2016	CAF	Panama	Waste Water Management Project for Burunga and Arraiján Cabecera	95
2016	IADB	Argentina	Water and Sanitation Program for the Buenos Aires Metropolitan Area and Conurbat	320
2016	IADB	Bolivia	National Irrigation Program with a Watershed Approach III	158
2016	IADB	Brazil	Federal District Environmental Sanitation and Land Management Program	100
2016	IADB	Panama	Sanitation Program for the District of Arraijan and La Chorrera	150
2016	WB	Colombia	Water Supply and Basic Sanitation Infrastructure and Service Delivery Project	127
2015	AFD	Mexico	Program to support the water sector policy in Mexico	122
2015	AFD	Colombia	Water resource management in Colombia	92
2015	CAF	Argentina	Potable Water Program AySA-FASE II	120
2015	IADB	Mexico	Comprehensive Development Project for Water and Sanitation Utilities	200
2015	IADB	Argentina	Water and Sanitation Program for Metropolitan Areas	200
2015	IADB/CAF	Panama	Panama City and Bay Sanitation Program II	110 + 110 = 220
2015	WB	Ecuador	Guayaquil Wastewater Management Project	103
2013	CAF	Ecuador	Environmental Sanitation Program for Community Development	275
2013	IADB	Mexico	Sustainability of Water Supply for Rural Communities	450
2012	IADB	Argentina	Development Programme's Norte Grande provinces: Water & Sanitation Infrastructure	500
2011	IADB	Brazil	Environmental Sanitation Program for Municípios in the Guanabara Bay Area-PSAM	452
2010	CAF	Ecuador	Environmental sanitation program for community development	300
2009	CAF	Argentina	Program to support public investment in the water supply and sanitation sectors	275
2009	IADB	Brazil	Tiete River Cleanup Program, Stage III	600
2009	IADB	Colombia	Medellin River Sanitation Program — Phase II	450

Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database.

Table 7
Selected climate adaptation projects.

Year	Bank	Country	Project	Amount (USD million)
2016	CAF	Argentina	Integrated Management Plan of La Cuenca del Río Luján — Phase I	100
2016	CAF	Peru	Credit Line — Natural Disaster Management	300
2016	IADB/WB	Ecuador	Emergency Program for an Immediate Response to the Earthquake	20/200
2015	WB	Bolivia	Disaster Risk Management DPC and DPL	200
2015	IADB	Bolivia	Disaster Risk Management Program	143
2015	CaDB	Dominica	Rehabilitation and reconstruction-tropical storm Erika	30
2014	IADB	Jamaica	Adaptation Program and Financing Mechanism for the Pilot Program for Climate Resilience (PPCR) Jamaica	10
2014	World Bank	Belize	Climate Resilient Infrastructure	30
2013	AFD	Mexico	Support for Agriculture to Fight Climate Change	49
2012	IADB	Panama	Program to Reduce Vulnerability to Natural Disaster and Climate Change II	100
2012	WB	Mexico	Strengthening Social Resilience to Climate Change	300
2011	CAF	Bolivia	Natural Disaster Prevention Program	42
2009	CaDB	St Lucia	Caribbean Natural Catastrophe Insurance	20
2009	CAF	Dominican Republic	Improving the Quality of Housing and Reduce Vulnerability to Natural Hazards in a Population of Over 18,500 Low-income Residents.	80
2008	CaDB	Jamaica	Natural Disaster Management Kingston Metropolitan Area Drainage Rehabilitation Work	30

Source: Respective annual reports and official databases; Chinese source: China-Latin America Finance Database.

4. Econometric Analysis: What Determines Green Financial Flows in LAC?

Using the empirical strategies discussed in Section 2, we conduct analyses of the determinants of green finance lending in LAC, using the newly created green finance data between 2007 and 2016 as the core dependent variable. Considering the limited time period, the analyses might not provide causal inference but shed some light on understanding green financial flows in LAC.

Our probit regression in Table 8 column (1) demonstrates that countries with weak environmental performance are more likely to receive green finance from development banks, and banks with shareholder environmental performance tend to make more green commitments. Moreover, countries that have higher HDI scores and have left-leaning ruling political party are more likely to receive green finance.

We conduct a panel analysis to examine the determinants of the total percentage of green finance in a host country borrowing portfolio from DFIS. Table 8 columns (2)–(4) show the results of the panel analysis. When controlling country and/or year effects, donor's environmental performance become the most important factor in determining the greenness of a bank's lending. We find that 1% increase in donor's EPI is associated with 0.4–0.7 percentage points increase in the green share of total commitments to a country. This finding shows that donor's environmental preference is the most important determinant for green lending at least during the period of our analysis. This is consistent with our findings in Section 3 that European banks with better dominant shareholder environmental performance are more in favor of green lending.

Table 8
Determinants of green finance.

Variables	Probit	Panel		
	(1)	(2)	(3)	(4)
	Received green finance	Green percentage	Green percentage	Green percentage
Ln EPI host	−0.978**	0.0231	−0.249*	0.0475
	(0.335)	(0.183)	(0.210)	(0.284)
Ln EPI donor	1.436***	0.617***	0.373**	0.710***
	(0.385)	(0.176)	(0.153)	(0.186)
Ln GDP	−0.335	−0.00455	−0.339	0.0631
	(0.266)	(0.0980)	(0.431)	(0.504)
Inflation	−0.008	−0.00153	−0.00722	−0.00638
	(0.008)	(0.00319)	(0.00570)	(0.00645)
Ln HDI	3.191**	0.347	2.996	4.205
	(1.541)	(0.576)	(2.825)	(3.418)
Political proximity	−0.871	−0.0683	−0.0693	−0.0550
	(0.118)	(0.0442)	(0.0502)	(0.0503)
Political orientation of recipients	−0.259***	−0.0645**	−0.0403	−0.0359
	(0.074)	(0.0272)	(0.0446)	(0.0482)
Constant	1.681	0.0231	−0.249	0.0475
	(3.393)	(0.183)	(0.210)	(0.284)
Observations	630	630	630	630
R-squared			0.024	0.054
Number of country		26	26	26
Year fixed effects		Yes	No	Yes
Country fixed effects		No	Yes	Yes

Standard errors are in parenthesis.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

The probit analysis indicates that there is an equilibrium between the 'demand' and 'supply' of green finance regarding the extent to which host countries receive green finance. In countries with a higher HDI and stronger EPI—implying a greater emphasis on sustainable development, there is a higher demand for green finance. Those countries tend to 'match' with DFIs that tend to emphasize a greener portfolio—the European-based DFIs and to some extent the IDB.

When extending to a panel regression strategy and adding year and country fixed effects, the only finding that holds up to such robustness is the EPI of the donor DFI. In other words, over time and across countries green financial flows appear to be 'donor driven' regardless of the demand profile, political persuasion, and other characteristics of the host country.

In sum, controlling for other factors, it appears that attracting green financial flows is a function of host country demand and DFI shareholder preferences (supply) for green financial outflows. The overall magnitude and composition of green financial flows appears to largely be a function of donor preferences and mandates.

5. Conclusion

In this paper, we take stock of green finance commitments from development banks in LAC between 2007 and 2016. We adopt a mapping approach that was jointly agreed by MDBs and the IDFC in 2015. We demonstrate the annual green finance from public DFIs in the Americas stands at approximately $7 billion per year, with climate finance just $4.4 billion per year. The size of green commitments identified in the first part of the paper shows that green financial flows currently fall far short of closing the climate finance gap in the region, which is as high as $100 billion annually (IADB, 2012).

The private sector and fiscal outlays from governments will have to increase their contributions in order to blend their efforts toward climate-friendly capital formation in the region. That said, DFIs have the potential to play a major catalyzing role in such a transformation. First, the econometric analysis in this paper indicates that if borrowing countries 'demand' green financial flows they are more apt to receive it, especially from DFIs that prioritize green finance. Second, the panel regressions show that an increase in the supply of green financial funds can result in an increase in the composition of green financial flows in host country balance sheets. This is encouraging given that there is increasing momentum to shift the share of DFI lending toward greener lending.

The IDB and other major MDBs have pledged to shift more than one third of their lending toward green finance, and with the IDFC have agreed to measure and report on progress on an annual basis. IDFC DFIs, while not agreeing to compositional targets, have also agreed to the same tracking methodology and have pledged to raise a specific sum toward green finance targets. These efforts are novel, and this paper indicates that if such efforts were ambitiously increased the region would make substantially more progress in meeting the twin goals of environmental and economic sustainability.

Annex I

Databases

Gallagher, Kevin P. and Margaret Myers (2014) "China-Latin America Finance Database," Washington: Inter-American Dialogue. http://www.thedialogue.org/map_list/.

Inter-American Development Bank. "Projects," http://www.iadb.org/en/projects/projects,1229.html.

KfW. "KfW Development Finance," https://www.kfw.de/microsites/Microsite/transparenz.kfw.de/?r=ASE#/start.

The Brazilian Development Bank. "Consulta a financiamento de exportação," http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/BNDES_Transparente/consulta_as_operacoes_exportacao/index.html.

World Bank. "Projects & Operations," http://www.worldbank.org/projects.

Annual Reports

Agence Française de Développement (2017), Annual report (various years), Paris, Agence Française de Développement, 2017.

Caribbean Development Bank (2017), Annual report (various years), St Michael, Caribbean Development Bank, 2017.

Corporación Andina de Fomento (2017), Annual report (various years), Bogotá, Corporación Andina de Fomento, 2017.

European Investment Bank (2017), Report on results outside the EU (various years), Luxembourg, European Investment Bank, 2017.

Export-Import Bank of the Unites States (2017), Annual report (various years), Washington, Export-Import Bank of the Unites States, 2017.

Inter-American Development Bank (2017), Annual report (various years), Washington, Inter-American Development Bank, 2017.

KfW (2017), Annual report on cooperation with developing countries (various years), Frankfurt, KfW, 2017.

References

Adams, W.M., 2009. Green Development: Environment and Sustainability in a Developing World, 3rd edition. Routledge, London.

Alesina, A., Dollar, D., 2000. Who gives foreign aid to whom and why? J. Econ. Growth 5 (1), 33–63.

Anderson, A., Hansen, H., Markussen, T., 2006. US politics and world bank IDA-lending. J. Dev. Stud. 42 (5), 772–794.

Babb, S., 2009. Behind the Development Banks: Washington Politics, World Poverty, and the Wealth of Nations. University of Chicago Press, Chicago.

Baros, N., Cole, J.J., Tranvik, L., 2011. Carbon emissions from hydroelectric reservoirs linked to reservoir age and Latititude. Nat. Geosci. 4, 593–596.

BNDES, 2014. BNDES Receives US$335 Million From Gemany's KfW Bank in Support of Renewable Energy. press release on July 21, 2014. http://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/Institucional/Press/Noticias/2014/20140721_kfw.html.

Cadena, A., Remes, J., Grosman, N., de Oliveira, A., 2017. Where Will Latin America's Growth Come From? McKinsey Global Institute.

CAF, 2013. KfW Invests USD 200 Million to Improve Latin America Public Transportation Through a CAF Initiative. press release on October 11, 2013. http://www.caf.com/en/currently/news/2013/10/kfw-invests-usd200-million-to-improve-latin-america-public-transportation-through-a-caf-initiative/?parent=16112.

Center for Environmental Law & Policy, 2016. Environmental Performance Index. https://epi.envirocenter.yale.edu/2018-epi-report/executive-summary.

Dixon, J.A., Carpenter, R.A., Fallon, L.A., Sherman, P.B., Manipomoke, S., 2009. Econometric Analysis of the Environmental Impacts of Development Projects (Environmental and Resource Economics Set). Routledge Reprint edition.

Dowling, J.M., Hiemenz, U., 1985. Biases in the allocation of foreign aid: some new evidence. World Dev. 13 (4), 535–541.

Dreher, A., Sturm, J., Vreeland, J.R., 2009. Development aid and international politics: does membership on the UN Security Council influence World Bank decisions? J. Dev. Econ. 88, 1–18.

Gallagher, K.P., Irwin, A., 2015. China's economic statecraft in Latin America: evidence from China's policy banks. Pac. Aff. 88 (1), 98–121.

Gallagher, Kevin P., Myers, Margaret, 2014. China-Latin America Finance Database. Inter-American Dialogue, Washington. http://www.thedialogue.org/map_list/.

Harrigan, J., Wang, C., El-Said, H., 2006. The economic and political determinants of IMF and world bank lending in the Middle East and North Africa. World Dev. 34 (2), 247–270.

Hicks, R., Parks, B., Roberts, J.T., Tierney, M., 2008. Greening Aid? Oxford University Press, Oxford.

Hopkins, R., Powell, A., Roy, A., Gilbert, C.L., 1998. The World Bank and conditionality. J. Int. Dev. 9 (4), 507–516.

Humphrey, C., Michaelowa, K., 2013. Shopping for development: multilateral lending, shareholder composition and borrower preferences. World Dev. 22, 142–155.

IFC, 2013. Leverage in IFC's Climate-related Investments: A Review of 9 Years of Activity (Fiscal Year 2005–2013). International Finance Corporation, Washington.

Inter-American Development Bank, 2012. The Climate and Development Challenge for Latin America and the Caribbean: Options for Climate Resilient Low Carbon Development. Washington, Inter-American Development Bank.

Inter-American Development Bank, 2013. China to Provide $2 Billion for Latin America and the Caribbean Co-financing Fund. press release on March 16, 2013. http://www.iadb.org/en/news/news-releases/2013-03-16/china-co-financing-fund,10375.html.

Inter-American Development Bank, 2015a. Sustainable Off-grid Renewable Energy Solutions for Remote Communities. project information. http://www.iadb.org/en/projects/project-description-title,1303.html?id=EC-M1063.

Inter-American Development Bank, 2015b. IDB Finances Valentines and Colonia Arias Wind Farms in Uruguay. Press release on May 7, 2013. http://www.iadb.org/en/news/news-releases/2015-05-07/idb-approves-two-wind-projects-in-uruguay,11153.html.

International Development Finance Club, 2014a. IDFC Green Finance Tracking Methodology 2014 Germany, IDFC.

International Development Finance Club, 2014b. Financing Sustainable Infrastructure. IDFC, Germany.
International Development Finance Club, 2015a. Climate Finance Tracking Comparison of the MDBs and IDFC Methodologies. IDFC, Germany.
International Development Finance Club, 2015b. Common Principles for Tracking Climate Mitigation Finance; Collaboration on Climate Adaptation Finance. IDFC, Germany.
Isenman, P., 1976. Biases in aid allocations against poorer and larger counties. World Dev. 4 (8), 631–641.
Kilby, C., 2006. Donor influence in multilateral development banks: the case of the Asian Development Bank. Rev. Int. Organ. 1 (2), 173–195.
Mapplecroft, 2014. Vulnerability Index to Climate Change in the Latin American and Caribbean Region. CAF-Development Bank of Latin America, Caracas, Venezuela.
MDBs, 2016. Joint Report on Multilateral Development Banks' Climate Finance. www.ebrd.com/2016-joint-report-on-mdbs-climate-finance.pdf.
Neumayer, E., 2003a. The determinants of aid allocation by regional multilateral development banks and United Nations agencies. Int. Stud. Q. 48 (1), 101–122.
Neumayer, E., 2003b. The Pattern of Aid Giving. Routledge, London.
Nielson, D.L., Tierney, M.J., 2006. Principals and Interests: Common Agency and Multilateral Development Bank Lending. Unpublished working paper.
Ray, R., 2016. The panda's pawprint: the environmental impact of the China-led re-primarization in Latin American and the Caribbean. In: GEGI Working Paper.
Rich, B., 2014. Mortgaging the Earth: World Bank, Environmental Impoverishment and the Crisis of Development. Routledge.
Richter, Alexander, 11 May 2016. KfW to provide $290m to CAF for geothermal projects in Latin America. http://www.thinkgeoenergy.com/kfw-to-provide-290m-to-caf-for-geothermal-projects-in-latin-america/.
Round, J.I., Odedokun, M., 2004. Aid effort and its determinants. Int. Rev. Econ. Financ. 13 (3), 293–309.
Steinhurst, W., Knight, P., Schultz, M., 2012. Hydropower Greenhouse Gas Emissions: State of the Research. Synapse Energy Economics, Inc., Cambridge, Massachusetts, USA.
United Nations, 2015. Goal 9: build resilient infrastructure, promote sustainable industrialization and foster innovation. In: Sustainable Development Goals, New York, United Nations. http://www.un.org/sustainabledevelopment/infrastructure-industrialization/.
World Bank, 2018. World Development Indicators Database.